

**RECEIVED
CENTRAL FAX CENTER****DEC 26 2006**

Docket No. 740819-448

Serial No. 09/707,844

Page 5

REMARKS

The Official Action dated September 25, 2006, has been received and its contents carefully noted. In view thereof, claims 11 and 15 have been amended and new claims 19-21 have been added in order to better define that which Applicants regard as the invention. Accordingly, claims 11-21 are presently pending in the instant application.

With reference now to the Official Action and particularly page 2 thereof, claims 11-14, 17 and 18 have been rejected under 35 U.S.C. §102(b) as being anticipated by U.S. Patent No. 5,151,770 issued to Inoue. This rejection is respectfully traversed in that the patent to Inoue neither discloses nor suggests that which is presently set forth by Applicants' claimed invention.

As can be seen from the foregoing amendments, independent claim 11 has been amended to recite an RF device comprising a plurality of semiconductor elements formed on a semiconductor substrate composed of a semiconductor material, a plurality of through holes which are provided between two adjacent ones of the plurality of semiconductor elements and pass from a surface through the backside of the semiconductor substrate wherein a distance between two adjacent holes of the plurality of through holes is smaller than a thickness of the semiconductor substrate so as to reduce power leaking between two adjacent ones of the plurality of semiconductor elements. That is, a particular feature of the RF device recited in independent claim 11 resides not only in the fact that the distance between the two adjacent through holes is smaller than the thickness of the semiconductor substrate so as to reduce power leakage between two adjacent semiconductor elements, but also that the device includes a plurality of semiconductor elements formed on a semiconductor substrate composed of a semiconductor material. In accordance with Applicants' claimed invention and as set forth on page 8, lines 13-18 of Applicants' specification as well as Fig. 2, such a

Docket No. 740819-448

Serial No. 09/707,844

Page 6

feature improves the isolation between the two semiconductor elements devices having through holes therebetween with respect to the radio frequency signal. Clearly, the patent to Inoue neither discloses nor remotely suggests that which is presently set forth by Applicants' claimed invention.

Again, In reviewing the teachings of Inoue, it is noted that this reference discloses having a distance of 100 μm between two adjacent through holes, using GaAs as a substrate, and that a thickness of the substrate is larger than the distance between two adjacent through holes. The thickness of the substrate mentioned in Inoue includes a thickness of the substrate and a thickness of an insulating layer formed on the substrate, i.e. 500 μm plus a thickness of the substrate 21. Hence, as the Examiner can readily appreciate, it is not merely a thickness of the substrate 21 itself. Since Inoue does not disclose a thickness of the substrate 21, the relationship between the through holes and the thickness of the substrate is not and can not be determined from the teachings of Inoue.

In addition, it is noted that a principal objective of Inoue is to form the through holes in the insulating layer. In general, insulating layers have a smaller dielectric constant than semiconductor substrates. Consequently, radio frequency signals propagate more to the semiconductor substrate than the insulating layer in Inoue. Accordingly, even if Inoue forms the through holes in the insulating layer with smaller distance between two adjacent through holes, it is impossible for Inoue to greatly improve isolation between two adjacent elements as is the case with Applicant's claimed invention. Accordingly, it is respectfully submitted that Applicants' claimed invention as set forth in independent claim 11 as well as those claims which depend therefrom clearly distinguishes over the teachings of Inoue and is in proper condition for allowance.

Docket No. 740819-448

Serial No. 09/707,844

Page 7

With reference now to page 3 of the Office Action, claims 15 and 16 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Inoue as applied to claims 11-14 and further in view of U.S. Patent No. 6,229,209 issued to Nakamura et al. This rejection is respectfully traversed in that the patent to Nakamura et al. does nothing to overcome the aforementioned shortcomings associated with the teachings of Inoue.

Initially, in rejecting Applicants' claimed invention it is noted that the Examiner states that Inoue renders obvious the limitations in the claims as discussed above except for a second group of through holes which are provided in electrodes of the plurality of semiconductor elements, passed from a surface through the backside of the substrate, and whose faces are covered with a conductive material. In this regard, for the reasons discussed hereinabove, it is again respectfully asserted that Applicants' claimed invention is not rendered obvious in view of the teachings of Inoue as discussed in detail hereinabove.

Additionally, as can be seen from the foregoing amendments, independent claim 15 has been amended to recite an RF device comprising a plurality of semiconductor elements formed in a semiconductor substrate composed of a semiconductor material, a first group of through holes which are provided between two adjacent ones of the plurality of semiconductor elements and passed from a surface through the backside of the semiconductor substrate and whose side faces are covered with a conductive material, a second group of through holes which are provided in electrodes of the plurality of semiconductor elements, passed from a surface through the backside of the semiconductor substrate, and whose side faces are covered with the conductive material, wherein the conductive material which covers the side faces of the first and second groups of through holes is electrically connected to a first wiring layer provided on the backside of the substrate, and a distance between two adjacent ones of the first group of through holes is smaller than a thickness of the

Docket No. 740819-448

Serial No. 09/707,844

Page 8

semiconductor substrate so as to reduce power leakage between two adjacent ones of the plurality of semiconductor elements. Again, as discussed in detail hereinabove it is respectfully submitted that the patent to Inoue neither discloses nor remotely suggests such features. Further, the patent to Nakamura et al. fails to overcome such shortcomings.

With respect to the teachings of Nakamura et al., it is noted that this reference discloses two kinds of through holes and that side faces of the second through holes are covered with a metal layer. That is, as discussed in Applicant's previous response, this reference merely discloses that side faces of through holes are covered with a metal layer; however, this reference fails to disclose that the isolation between the adjacent semiconductor elements is improved by shortening the distance between the two adjacent through holes. This reference as well as the combination proposed by the Examiner is silent with respect to improving isolation between two adjacent elements by making a distance between two adjacent through holes small. Furthermore, According to the invention of claim 15, it is possible to simultaneously form the first group of through holes and the second group of through holes. In other words, thorough holes for shielding and through holes for electrodes of a semiconductor device can be simultaneously formed. This feature being discussed in detail on page 10 lines 14-17 of Applicant's specification. It is noted that neither Inoue or Nakamura disclose through holes for different purposes; consequently, simultaneously forming a first group of through holes and a second group of through holes as recited in claim 15 is no where even remotely contemplated in the combination of references proposed by the Examiner. Accordingly, it is respectfully submitted that Applicants' claimed invention as set forth in independent claim 15 as well as those claims which depend therefrom clearly distinguish over the combination proposed by the Examiner and is in proper condition for allowance.

10234677.1

Docket No. 740819-448

Serial No. 09/707,844

Page 9

With respect to new claims 19-21, these claims recite that it is possible to downsize an RF device by connecting elements of the RF device to a wiring layer. This feature being supported by Applicant's specification, and particularly Figures 5(d) and 6. Neither Inoue nor Nakamura discloses this feature of the present invention. Accordingly, downsizing the RF device as set forth in claims 19-21 clearly distinguishes Applicant's claimed invention over that of the prior art of record and therefore, claims 19-21 are believed to be in proper condition for allowance.

Therefore, in view of the foregoing it is respectfully requested that the rejections of record be reconsidered and withdrawn by the Examiner, that claims 11-21 be allowed and that the application be passed to issue.

Should the Examiner believe a conference would be of benefit in expediting the prosecution of the instant application, he is hereby invited to telephone counsel to arrange such a conference.

Respectfully submitted,



Donald R. Studebaker

Reg. No. 32,815

Nixon Peabody LLP
401 9th Street N.W.
Suite 900
Washington, D. C. 20004
(202) 585-8000